

Biological Opinion and Incidental Take Statement
for Indiana bat (*Myotis sodalis*) at the Department of the Army 88th
Regional Readiness Command U.S. Army Reserve Center,
Twinsburg Township, Summit County, Ohio.

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (FWS or Service) Biological Opinion (BO) based on our review of the proposed Department of the Army, 88th Regional Readiness Command's (RRC) U.S. Army Reserve (USAR) Training Center, to be located in Twinsburg Township, Summit County, Ohio, and its effects on the Indiana bat (*Myotis sodalis*) per section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). RRC's January 13, 2005 request for formal consultation was received on January 18, 2005, and formal consultation was initiated on January 18, 2005.

This biological opinion is based on information provided in the May 26, 2004 Biological Evaluation, January 2005 Biological Assessment, the February 24, 2005 RRC letter, FWS's July 2004 site inspection, numerous telephone conversations and e-mails between the FWS, RRC, and their representatives, and other sources of information. A complete administrative record for this consultation is on file at the Reynoldsburg, Ohio Ecological Services Field Office (ROFO).

CONSULTATION HISTORY

Table 1. Consultation History for USAR 88th RRC training center project

Date	Event	Comment
27-May-04	USAR submits Biological Evaluation (BE)	Determines project is not likely to adversely affect (NLTAA) Indiana bat and requests concurrence.
23-Jun-04	Service responds to BE	Service cannot concur with determination, more data is required. Mist net survey recommended.
15-Jul-04	BHE Environmental, Inc. submits mist net survey protocol to Service	Service concurs with survey protocol.
27-Jul-04	Service representative conducts site visit to assess bat habitat	General habitat is noted, photographs taken.
24-Sep-04	USAR submits mist net survey results to Service	
29-Sep-04	Service submits e-mail to USAR and USEPA	Requests mist net survey results, and assessment of bat habitat and potential impacts.
29-Sep-04	Service receives mist net survey results from USAR, dated 24-Sept-04	Mist net survey did not capture Indiana bats.
27-Oct-04	Service responds to mist net survey results	Requests preparation of Biological Assessment (BA), assessing habitat impacts, direct and indirect effects to the bat, avoidance and minimization measures, and cumulative effects.
28-Oct-04	BHE Environmental, Inc. requests species list for BA	Service concurs that Indiana bat is only species for which Section 7 consultation is necessary.
01-Nov-04	Service/USAR/BHE Environmental, Inc. Conference call	Discussed content of BA, use of H.S.I. model for habitat evaluation, cumulative effects analysis, avoidance and minimization measures, etc.
13-Dec-04	USAR submits Draft BA to Service	Includes determination of NLTAA Indiana bat.

29-Dec-04	Service/USAR/BHE Environmental, Inc. Conference call	Service provides preliminary comments on Draft BA, re: definition of action area, preserved area, wetland mitigation, forested buffers, and effects analysis.
03-Jan-05	Service/USAR/BHE Environmental, Inc. Conference call	Feedback on Service comments re: location of preserved area, action area definition, effects analysis.
03-Jan-05	Service submits e-mail to USAR	Summary of comments on Draft BA, as identified in conference calls.
13-Jan-05	USAR submits Final BA to Service	Determines project is NLTA Indiana bat and requests concurrence, or if no concurrence, requests initiation of formal consultation.
18-Jan-05	Service receives Final BA	
26-Jan-05	Service responds to Final BA	Unable to concur with NLTA determination. Recommend initiation of formal consultation. Information is complete, clock started effective Jan. 18, 2005. Biological Opinion will be complete by June 2, 2005.
11-Feb-05	Service/USAR/BHE Environmental, Inc. meeting in Columbus, OH	Discuss wetland mitigation, avoidance of impacts to specific roost trees, habitat improvements on 5-acre set-aside, and an expedited timeframe for consultation.
24-Feb-05	USAR letter to Service	Documents in writing, conservation measures agreed to at 11-Feb-05 meeting
31-Mar-05	Service submits Draft Biological Opinion (BO) to USAR	Determines harm and harassment via habitat loss will occur.
7-Apr-05	USAR submits comments on Draft BO to Service	Minor changes recommended, generally clarifying information in Draft BO; includes information on measures to minimize water quality impacts.

USAR's January 13, 2005 Biological Assessment (BA) was received by the Service on January 18, 2005. In this BA, USAR determined that the project may affect, but is not likely to adversely affect, the Indiana bat. USAR requested Service concurrence on the determination, or in the event of a non-concurrence, requested that formal consultation under Section 7 of the Act be initiated. In a January 26, 2005 response letter, the Service: (1) Did not concur with the determination that the project was not likely to adversely affect the Indiana bat; (2) Initiated formal consultation effective January 18, 2005; and (3) Indicated that the initiation package associated with the request for formal consultation was complete in accordance with 50 CFR §402.14. On March 31, 2005, the Service submitted a Draft Biological Opinion to the USAR, documenting that adverse affects to the Indiana bat would occur in the form of harm and harassment due to habitat loss. On April 7, 2005, USAR submitted comments on the Draft BO to the Service. The comments generally clarified the information presented in the Draft BO, recommended editorial changes, and provided additional information on measures that will be taken to minimize impacts to water quality during construction of the project.

USAR's May 27, 2004 Biological Evaluation (BE) and cover letter determined that the project would have no effect on the Federal threatened bald eagle (*Haliaeetus leucocephalus*) and northern monkshood (*Aconitum noveboracense*). These determinations were based on a lack of

suitable habitat for either of these species within the project area, and no current or historical records of these species within the project area. These species will not be impacted by this action and will not be discussed further in this Biological Opinion.

BIOLOGICAL OPINION

Description of the Proposed Action

The USAR proposes to consolidate six USAR Centers in the Cleveland area into one new complex at a site in Twinsburg Township, Summit County, Ohio. The proposed action would include construction of a new USAR training center on a 24-acre undeveloped parcel of land located west of Chamberlin Road, just south of East Aurora Road. The proposed development actions include clearing and grading of approximately 18 acres of the site, and construction would include an administration building, an Area Maintenance Support Activity (military vehicle maintenance shop), an unheated equipment storage building, as well as associated military and privately owned vehicle parking (USAR 2004). The center would be a training and maintenance facility for approximately 873 soldiers from 15 reserve units. Approximately 70 full time personnel would staff the facility. Reservists would primarily use the facility during drill weekends. The six existing facilities would be closed and the affected units and associated military equipment would be moved to the new USAR Center.

As identified in USAR's BA (2005), the total area of disturbance would consist of approximately 18 acres. Tree clearing and grading would occur within this 18-acre area to accommodate the new construction. As stated in the BE (2004), the construction would create approximately 449,061 square feet (SF) of new impervious surfaces including 85,360 SF of building footprint and 363,701 SF of parking, access roads, and sidewalks. Subsequent discussions between the USAR and Service identified that the site will be fenced, and that 30-foot cleared buffer areas (typically composed of mowed grass) along the fence and adjacent to buildings must be maintained during operation of the facility for safety and security purposes.

The northern 5 acres of the site will be maintained in a natural state, and used to conduct limited, non-destructive military training activities. Such activities will include: (1) individual soldier skills training (e.g., dismounted land navigation to include map reading and compass use; first aid; communications); (2) dismounted individual and small unit (20 persons or less) tactics such as movement formations and reaction to (simulated) enemy contact; and (3) small unit (20 persons or less) bivouacking (camping). No heavy equipment will be used in the 5-acre set-aside.

The 2005 BA, the February 24, 2005 USAR letter to the Service, and the April 7, 2005 letter providing comments on the Draft BO identify conservation measures the USAR intends to implement as part of the project for the purposes of avoiding, minimizing, and mitigating incidental take that may occur as a result of implementation of the proposed project. A summary of the proposed conservation measures is provided below (see BA, February 24, 2005, and April 7, 2005 letters for additional information). Implementation of the proposed conservation measures will avoid direct take of the Indiana bat and help to ensure that some portion of the

property remains suitable habitat for the bat in perpetuity, and that any adverse effects are minimized to the maximum extent practicable.

1. The northern 5 acres of the 24-acre site, including a minimum of 17 potential roost trees (PRTs) greater than 1.9 inches diameter at breast height (dbh) and 1.2 acres of palustrine forested wetlands, will be preserved in a natural state. Preservation of this 5-acre parcel will provide suitable roosting and foraging habitat for the bat in perpetuity and provide connectivity among adjacent forested parcels including the forested areas within the neighboring Longwood Park.
2. A forested buffer strip averaging 30 feet in width will be maintained along the western property boundary. The minimum width of this strip will be 20 feet. Prior to any tree clearing, an Environmental Inspector will identify PRTs along the western property boundary; the buffer will be designed to incorporate as many existing PRTs and future PRTs as practicable, considering health and safety concerns.
3. Tree-lines will be created along the southern and eastern property boundaries to provide connectivity between adjacent forested parcels and to provide navigational corridors for any Indiana bats that may use the site. These tree lines will be planted with saplings ≥ 5 feet in height, and where possible will include trees from the Service's list of native tree species that typically provide suitable Indiana bat roosting habitat. If mortality of planted trees exceeds 20% within the first 5 years after planting, the losses beyond 20% will be compensated for by replanting. Five years after planting USAR will provide a letter report to the Service describing conditions of planted trees and any excess mortality which will be compensated for by replanting.
4. USAR commits to preserving approximately 1 acre of additional forested habitat to be located directly south of the northern 5-acre set-aside. Within 60 feet of the 5-acre set-aside, only 50% of trees will be cleared. This will preserve additional high quality roosting and foraging habitat for the bat.
5. The northern 5-acre set aside will be managed to improve habitat for the Indiana bat, consistent with the Indiana Bat Summer Habitat Suitability Index Model. Indiana bat habitat improvements will occur within two years of initiation of tree-clearing on the site. Such improvements will be coordinated with the Service prior to implementation, and may include thinning dense understory trees, creating potential roost trees by girdling, creating small openings in the canopy cover, thinning overstocked midstory and overstory trees, and tree planting.
6. An environmental inspector (EI), selected from the Service's list of federally permitted Indiana bat consultants, will be on-site during tree-clearing to ensure such activities are conducted in accordance with seasonal clearing restrictions (see item 7 below), and to ensure the forested buffer along the western boundary of the site is maintained. Furthermore, the EI will identify existing and future PRTs within the western property boundary that will be preserved. Finally, the EI will be on-site during silvicultural treatments in the 5-acre set aside to ensure activities are applied according to prescriptions developed in conjunction with the Service.

7. All tree clearing will occur only between November 1 and March 15, when Indiana bats are hibernating and would not be using the site for roosting or foraging.
8. The USAR will develop and distribute “field cards” (educational pamphlets) to full-time staff and soldiers using the USAR Center. Field cards will include information describing the Indiana bat and its habitat, as well as land-use restrictions on the property, as described in the BA.
9. Based on the proposed layout of the development, approximately 2.9 acres of wetlands will be impacted to facilitate construction. Through permitting and consultation with the Ohio Environmental Protection Agency (OEPA), these wetlands will be mitigated at a 2.5:1 ratio. At this rate, approximately 7.3 acres of wetlands will be created in accordance with mitigation guidance under Sections 404 and 401 of the Clean Water Act, administered by the U.S. Army Corps of Engineers and OEPA, respectively. The precise location of the mitigation wetlands is not known; however constructed wetlands will be located off-site and preferably within the Cuyahoga River watershed. At the request of the Service, USAR has examined opportunities for wetland mitigation that would improve Indiana bat habitat, specifically working in conjunction with Metro Parks Serving Summit County (MPSSC). At this time, no feasible wetland mitigation through MPSSC is available, however USAR has committed to checking back with MPSSC for wetland mitigation options prior to making a final decision on wetland mitigation. Feasible wetland mitigation opportunities in closest proximity to the suspected hibernaculum will be preferred.
10. USAR intends to minimize impacts to water quality due to construction activities by implementing the following measures: implement erosion control measures as the first step in construction; maintain above erosion control measures throughout the construction process; staging of construction activities to minimize the exposure time of cleared surfaces; staging of activities to allow for stabilization of disturbed soils; reestablishment of temporary and permanent vegetative cover at construction sites through planting, seeding, or sodding with both native and ornamental plants, stripping and stockpiling of top soil, spreading top soil after construction and mulching all seeded areas; and creating provisions for surface water and stormwater runoff controls which may include retention ponds, curbs, and gutters.

The USAR is responsible for ensuring implementation and compliance with the conservation measures in the BA, the February 24, 2005 letter, the April 7, 2005 letter, and the ITS. Specifically, the USAR will (1) implement the conservation measures identified in the BA, the February 24, 2005 letter, and the April 7, 2005 letter, (2) monitor compliance with the conservation measures, and (3) implement prompt corrective action to remedy any non-compliance observed. Failure to abide by these processes may result in non-compliance with the ITS and the USAR could be subject to section 9 enforcement and incur section 11 penalties.

Action Area

“Action area” is defined as all areas that will be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area is defined by measurable or detectable changes in land, air and water or to other measurable factors that may elicit a response in the species or critical habitat. The action area is not limited

to the “footprint” of the action and should consider the chemical and physical impacts to the environment resulting from the action.

The USAR has delineated the “direct and indirect effects analysis area” in the BA as the 24-acre site and the area within 0.6 miles of the site. The extent to which this area extended beyond the boundary of the site was based upon the mean travel distance of reproductively active female Indiana bats. This area was selected because they assumed the project had potential to impact any Indiana bats that roost within 0.6 miles of the site.

The Service has determined that the analysis area described in the BA was based upon the area to be directly impacted by the project (project footprint) and the typical area of movement for an Indiana bat maternity colony. However, as this delineation is not fully consistent with the regulatory definition of action area, we delineated the action area differently than the method described in the BA.

The Service determined the action area for this project based upon the biotic, chemical, and physical impacts to the environment that are anticipated due to the project. The area directly affected by the action is the 24-acre project footprint where all construction, operation, and maintenance activities will occur. The area indirectly affected by the action includes area affected by noise and vibrations and impacts to surface water resources outside of the 24-acre project footprint.

Noise and vibrations are physical impacts to the environment that will be caused by construction and operation of the proposed facility, and will vary in intensity depending upon the source. Clearing and grubbing of the site will generate noise during site preparation and construction equipment will generate noise throughout the duration of construction. The level of noise generated from the different construction and maintenance activities will vary depending upon the methods and equipment being used or operated. Operational noise will be generated by vehicle operation during construction, and day-to-day activities will generate low levels of noise once construction has been completed, although due to most operations occurring inside of the building facility, a significant change from the current ambient noise levels post construction is not expected.

Current ambient noise within the proposed 24-acre site varies depending on proximity to roads, park facilities, and adjacent properties, with the lowest noises expected closest to the center of the western property boundary, and the loudest noises expected adjacent to Chamberlin Road due to traffic. The Service estimates that current ambient noise levels are approximately 50 dBA (approximately the loudness of a clothes dryer when standing next to it) (FHWA website) at the quietest location onsite.

The highest project noise levels are expected to occur during the clearing and construction activities. Logging activities typically involve sawing equipment which can generate high noise levels (for example, chainsaws can generate a noise level of 110 dB). Typical construction noise levels are at an average of 85 dBA at 50 ft from the source (D. Snyder, FHWA, pers. comm.) with the peak noise level for most construction equipment at or below 95 dBA (FHWA website). To put these noise levels into perspective, normal human conversation measures about 60 dBA.

In general, human sound perception is such that a change in sound level of 3 dBA is just noticeable, a change of 5 dBA is clearly noticeable, and a change of 10 dBA is perceived as a doubling or halving of sound level (FHWA website).

The area that will experience the greatest increase in noise during construction will be the western portion of the project area where the current noise levels are the lowest. The average noise level produced during project construction is estimated to be 85 dBA (D. Snyder, FHWA, pers. comm.). Operational noise will be generated by vehicle operation, and day-to-day activities once construction has been completed, although due to most operations occurring inside of the building facility, a significant change from the current ambient noise levels post-construction is not expected.

The effects of noise are expected to occur approximately 3200 feet outside of the 24-acre project footprint, based on the following assumptions:

(1) The noise level at the quietest location on the property (center of the western property line) is estimated to be 50 dBA (approximately the loudness of a clothes dryer when standing next to it) (FHWA website)

(2) Noise level of construction equipment is approximately 85 dBA at 50 feet from the source (D. Snyder, FHWA, pers. comm.)

(3) Noise decreases by approximately 5 dBA per doubling of distance from source over soft ground with heavy vegetative ground cover (Dave Snyder, FHWA, pers. comm.)

Based on these assumptions, construction noise of 85 dBA at the edge of the property line would travel up to 3200 feet beyond the property line before the distance traveled by the noise reduces it to 50 dBA.

Impacts to surface waters are anticipated from the project. Wetlands will be directly and indirectly affected within the project footprint during the construction phase of the project. Also, some surface waters outside of the actual project footprint could be indirectly affected from the project due to the anticipated change in the volume of pollutants entering the environment (e.g., sediment and runoff from impermeable surfaces) and the alteration of surface water drainage patterns. The physical, chemical, and biological nature of wetlands will be altered by various activities such as grading and filling. USAR estimates that up to 2.9 acres of wetlands will be directly impacted by the project, while the Service suggests that additional impacts to adjacent offsite wetlands are likely. As some of the impacted wetlands are isolated from other waterbodies, no indirect “downstream” impacts are anticipated from filling of these wetlands. Indirect impacts to offsite wetlands adjacent to the southwest corner of the property, and adjacent to wetlands that will be filled onsite are anticipated. Such indirect impacts could include increased flow and sedimentation. We do not anticipate that these indirect impacts would occur outside of the 3200 foot area impacted by noise. Due to the limited footprint of excavation and ground disturbance, impacts to groundwater from the project are anticipated to be very minimal.

In summary, the Service defines the action area for the proposed USAR training center as the 24-acre USAR property plus an additional 3200-foot area surrounding the property that will be temporarily affected by construction noise. Once construction is complete and the facility is operational, most operations will occur indoors, and only minor localized increases in noise due to typical vehicle operation are anticipated.

Status of the Species

This section is a discussion of the Indiana bat which includes information on the species' life history, its habitat and distribution, and past human and natural factors that have led to the current status of the species.

The Indiana bat is a species that continues to decline since being listed as an endangered species in 1967. Recovery of this species faces several challenges and there are multiple biological reasons why the outlook for this species may be unfavorable. These reasons below will be discussed throughout this Biological Opinion as they pertain to the project impacts on the species.

- Indiana bats exhibit colonial behaviors in virtually every stage of their life history
- Male and female Indiana bats exhibit strong site fidelity to their summer grounds
- Resilience of Indiana bats is limited by the species' low reproductive capability
- The declining trend in Indiana bat numbers is both long-standing and widespread

The well-documented philopatric behavior of Indiana bats suggests that loss of roosting habitat alone can have adverse consequences (Kurta and Murray 2002; Gumbert et al. 2002). Healthy female bats start breeding their first fall and can produce one pup per year for up to 14-15 years (Humphrey et al. 1977). However, this current reproductive capacity has been insufficient to offset mortality rates over the last 40+ years. Indiana bat populations continue to plummet, with population decreases of 23 percent from 1960/70 – 1980, 30 percent from 1980 – 1990, and 19 percent from 1990 – 2000. The highest declines have been observed in the Southern part of the species range.

Description and Distribution

The Indiana bat is a medium-sized bat, closely resembling the little brown bat (*Myotis lucifugus*) but differing in coloration. There are no recognized subspecies. The Indiana bat has been found in 27 states throughout much of the eastern United States (USFWS 1999). More specifically, NatureServe (2004) describes its range as going from eastern Oklahoma, north to Iowa, Wisconsin, and Michigan, east to New England and south to western North Carolina, Virginia, and northern Alabama. It is virtually extirpated in the northeastern United States. The Indiana bat is migratory, and the above described range includes both summer and winter habitat. Major populations of this species hibernate in Indiana, Kentucky, and Missouri, with smaller populations reported in Alabama, Arkansas, Georgia, Illinois, Maryland, Mississippi, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Virginia, and West Virginia. The majority of maternity colonies are located in the glaciated midwest.

Life History and Population Dynamics

The lifespan for Indiana bats is generally between 5 and 10 years (Thomson 1982), but individuals may live much longer, with the oldest known bat captured 20 years after it was first banded (LaVal & LaVal 1980). Based on a 13-year study, Humphrey and Cope (1977) found that the adult period of life is characterized by two distinct survival phases. The first is a high

and apparently constant rate from 1 to 6 years after marking with 76% and 70% annual rates of survival for females and males, respectively. The second phase is a lower, constant rate after 6 years, with annual survival rates of 66% for females up to 10 years and 36% for males. In one study in Indiana, survival of pups was found to be very high at 92% from birth to weaning (Humphrey et al. 1977). Post-weaning to age 1 survival is unknown, but believed to be low.

The key stages in the annual cycle of Indiana bats are: hibernation, spring staging, pregnancy, lactation, volancy/weaning, migration, and swarming. While varying with weather and latitude, generally bats begin winter torpor in mid-September through late October and begin emerging in April. Females depart shortly after emerging and are pregnant when they reach their summer area. Birth of young occurs between mid-June and early July and then nursing continues until weaning, which is shortly after young become volant in mid to late July. Migration back to the hibernacula may begin in August and continue through September. Males depart later from the hibernacula and begin migrating back earlier than females.

Hibernation

Generally, Indiana bats hibernate from October through April depending upon local weather conditions. Bats cluster on cave ceilings during hibernation and are capable of clustering in densities ranging from 300-484 bats per square foot. Hibernation facilitates survival during winter when prey are unavailable. However, the bat must store sufficient fat to support metabolic processes until spring. Substantial risks are posed by events during the winter that interrupt hibernation and increase metabolic rates.

After hibernation ends in late March or early April, most Indiana bats migrate to summer roosts. Female Indiana bats emerge from hibernation in late March or early April, followed by the males. The period after hibernation but prior to migration is typically referred to as staging. Most populations leave their hibernacula by late April. Migration is stressful for the Indiana bat, particularly in the spring when their fat reserves and food supplies are low. As a result, adult mortality may be the highest in late March and April.

Indiana bats have been documented hibernating in caves and/or mines that also support multiple other species of bat including little brown bat (*Myotis lucifugus*), pipistrelle (*Pipistrellus subflavus*), big brown bat (*Eptesicus fuscus*), and northern long-eared (*Myotis septentrionalis*) (Brack et al 2003)

Female Maternity Colony and Summer Roosting Habitat

Upon emergence from the hibernacula in the spring, females seek suitable habitat for maternity colonies (USFWS 1999). Females usually start grouping into larger maternity colonies by mid-May and give birth to a single young between late June and early July (Humphrey et al. 1977). These colonies are typically located under the sloughing bark of live, dead and partially dead trees in upland and lowland forest (Humphrey et al. 1977; Gardner et al. 1991). Colony trees are usually large-diameter, standing dead trees with direct exposure to sunlight. The warmer

temperature from sunlight exposure helps development of fetal and juvenile young (USFWS 1999). A maternity roost may contain up to 100 adult females and their pups.

Roost trees often provide suitable habitat as a maternity roost for only a short period of time. Roost trees are ephemeral in nature; suitable trees fall to the ground or lose important structural characteristic such as bark exfoliation (Gardner et al. 1991; Britzke et al. 2003). Dead trees retain their bark for only a certain period of time (about 2-8 years). Once all bark has fallen off a tree, it is considered unsuitable to the Indiana bat for roosting. Gardner et al. (1991) found that 31% of Indiana bat occupied roost sites were unavailable the summer following their discovery; 33% of the remaining occupied roost sites were unavailable by the second summer.

However, female Indiana bats have shown strong site fidelity to their summer maternity grounds, and will use suitable roost trees in consecutive years, if they remain standing and have sloughing bark (Gardner et al. 1991; Callahan et al. 1997; Kurta and Murray 2002). Traditional summer sites are essential to the reproductive success of local populations. It is not known how long or how far female Indiana bats will search to find new roosting habitat if their traditional roost habitat is lost or degraded. If they are required to search for new roosting habitat, it is assumed that this effort places additional stress on pregnant females at a time when fat reserves are low or depleted and they are already stressed from the energy demands of migration.

It is unknown how many roosts are critical to the survival of the colony, but the temporary nature of the use of the roost trees dictates that several must be available in an area if the colony is to return to the same area and raise their young successfully. Indiana bats require many roost trees to fulfill their needs during the summer (Callahan et al. 1997). In Michigan, Indiana bats used two to four different roost trees during the course of one season (Kurta and Williams 1992). In Missouri, each colony used between 10-20 roost trees, and these were not widely dispersed (all within a circle ranging in size from 0.81 to 1.48 km) (Miller et al. 2002). The important factor associated with roost trees is their ability to protect individuals from the elements, and to provide thermal regulation of their environment. Maternity colonies have at least one primary roost, which is generally located in an opening or at the edge of a forest stand (USFWS 1999). Maternity colonies also use multiple alternative roosts which are located in the open or in the interior of forest stands (USFWS 1999). Exposure to sunlight is important during development of fetal and juvenile young. In Missouri, use of dead trees in the forest interior increased in response to unusually warm weather (i.e., shading provided a cooler thermal environment), and use of live trees and snags in interior forest increased during periods of precipitation (Miller et al. 2002). Maternity colonies in North Carolina and Tennessee used roosts located above the surrounding canopy (Britzke et al. 2003).

Indiana bats have been found roosting in several different species of trees, and it appears that they choose roost trees based on their structural composition. Therefore, it is difficult to determine if one particular species of tree is more important than others. However, twelve tree species have been listed in the Habitat Suitability Index Model as primary species (class 1 trees) (Rommé et al. 1995). These trees include silver maple (*Acer saccharinum*), shagbark hickory (*Carya ovata*), shellbark hickory (*C. laciniosa*), bitternut hickory (*C. cordiformis*), green ash (*Fraxinus pennsylvanica*), white ash (*F. americana*), eastern cottonwood (*Populus deltoides*), red oak (*Quercus rubra*), post oak (*Q. stellata*), white oak (*Q. alba*), slippery elm (*Ulmus rubra*), and

American elm (*Ulmus americana*). In addition to these species, sugar maple (*A. saccharum*), shingle oak (*Q. imbricaria*), and sassafras (*Sassafras albidum*) are listed as class 2 trees (Rommé et al. 1995). The class 2 trees are those species believed to be less important, but that still have the necessary characteristics to be used as roosts. These tree species are favored by the Indiana bat, since as these trees age, their bark will slough.

During a fall survey in Kentucky in 1994 and 1995, female Indiana bats utilized sourwood (*Oxydendrum arboreum*) and pignut hickory as roost trees and were found to roost singly (Kiser and Elliott 1996). The female's trees were between 6 and 10 inches in diameter and contained bark cover between 54 and 70 percent. Females tended to roost within 0.75 miles of the hibernacula, whereas males roosted anywhere from 0.95 to 2.35 miles from the hibernacula. Both males and females were found to use 2 to 3 roost trees for 2 to 3 days at a time (Kiser and Elliott 1996). Britzke et al. (2003) documented the use of conifers by maternity colonies in the mountains of Tennessee and North Carolina.

Male Roosting Habitat

Some adult males use mature forests around and near their hibernacula for roosting and foraging from spring through fall. However, some male bats have been found to leave the hibernacula area completely (USFWS 1999). Male Indiana bats have been found to use the same habitat in subsequent years (USFWS 1999).

Roost trees are primarily dead snags on upper slopes or ridgetops, however live shagbark hickory and pignut hickory (*Carya glabra*) trees have been recorded as roost trees. Male Indiana bats have been found to roost singly during autumn in scarlet oak (*Quercus coccinea*), Virginia pine (*Pinus virginiana*), red maple (*Acer rubrum*), shagbark hickory, and red oak. These trees ranged in diameter from 4.6 to 26 inches and had bark coverage ranging from 1 percent to 100 percent. However, the majority of the roost trees had bark coverage of at least 60 percent (Kiser and Elliott 1996).

During a 1999 radio telemetry survey on the Athens District of the Wayne National Forest, males were found roosting in American elm (*Ulmus americana*), red maple (*Acer rubrum*), shagbark hickory (*Carya ovata*), and sugar maple (*Acer saccharum*) trees. The average dbh of these trees was 11.8 inches and the average length of time each tree was used was 2.3 days (Schultes 2002). In 2000, two male Indiana bats were found roosting in American elm, red maple, black oak (*Quercus velutina*), white oak (*Quercus alba*), pignut hickory and shagbark hickory. The average dbh of these trees was 11.9 inches and the average length of time each tree was used was 1.9 days (Schultes 2002).

Foraging

Indiana bats feed exclusively on flying aquatic and terrestrial insects. Although there are no consistent trends, diet appears to vary across their range, as well as seasonally and with age, sex and reproductive-status (Murray and Kurta 2002; Belwood 1979). Murray and Kurta (2002)

found that diet is somewhat flexible across the range and that prey consumed is potentially affected by regional and local differences in bat assemblages and/or availability of foraging habitats and prey. For example, Murray and Kurta (2002) found that adult aquatic insects (Trichoptera and Diptera) made up 25-81% of Indiana bat diets in northern Indiana and Michigan. However, in the southern part of the species range terrestrial insects (Lepidoptera) were the most abundant prey items (as high as 85%) (Brack and LaVal 1985; LaVal and LaVal 1980; Belwood 1979). Kiser and Elliott (1996) found that Lepidopterans (moths), Coleopterans (beetles), Dipterans (true flies) and Homopterans (leafhoppers) accounted for the majority of prey items (87.9% and 93.5% combined for 1994 and 1995, respectively) consumed by male Indiana bats in their study in Kentucky. Diptera, Trichoptera, Lepidoptera, and Coleopterans also comprised the main prey of Indiana bats in Michigan (Murray and Kurta 2002), however, Hymenopterans (alate ants) were also taken when abundant.

Foraging habitat for male and female Indiana bats in the core of its range is assumed to include forest habitats with open understories and canopy closures of 50 to 70 percent (Romme et al. 1995). However, other foraging habitat includes upland, bottomland, and riparian woodlands, as well as forest and cropland edges, fallow fields, and areas of impounded water (Kiser and Elliott 1996). Other studies are showing that summer roosting and foraging areas, in parts of its range, can contain diverse cover types, including agricultural lands, residential areas, and open woodlands (Carter et al. 2002; Farmer et al. 2002; Miller et al. 2002).

Females tend to use larger foraging areas than males during the summer. One study recorded a post-lactating female as having a foraging range of approximately 530 acres; males had an area of approximately 140 acres (Kiser and Elliott 1996). New information from a Michigan study documented pregnant and lactating females traveling up to 2.6 miles from the day roost to foraging areas (Murray and Kurta 2004). Observations by Murray and Kurta (2004) indicated that female Indiana bats would not fly over open areas between foraging areas on the northern edge of its range in Michigan, but appeared to follow wooded corridors described as a narrow fence line of mature trees. These foraging areas included lakes, ponds, an area that was 50% wooded and 50% open fields, woodlands, and forested wetlands.

During summer months, some males remain near the hibernacula and forage along floodplain pastures, within dense forests and on ridge tops. Male Indiana bats generally travel between 1.2 and 2.6 miles from their summer roosts to summer foraging areas (USFWS 1999). A separate study indicated male Indiana bats have a minimum foraging area size of about 400 acres and a high use area size of 115 acres (Kiser and Elliott 1996).

During the fall, male bats were found to forage in upland, ridgetop forest as well as valley and riparian forest areas (USFWS 1999). Male Indiana bats tend to use larger foraging areas during autumn than in summer. However, female bats use even larger autumn foraging areas than males. During October, males were observed to be traveling between 0.89 and 1.5 miles to forage (Kiser and Elliott 1996).

Fall Swarming and Mating

From late-August to mid-October, prior to entering the hibernacula, large numbers of Indiana bats fly in and out of cave or mine openings from dusk till dawn in a behavior called swarming. Swarming usually lasts for several weeks and mating occurs toward the end of this period. Male Indiana bats tend to be active for a longer period of time than females during swarming and will enter the hibernacula later than the females (USFWS 1999). During a fall survey in Kentucky in 1994 and 1995, Kiser and Elliott (1996) identified that females tended to roost within 0.75 miles of the hibernacula, whereas males roosted anywhere from 0.95 to 2.35 miles from the hibernacula. Adult females store sperm through the winter thus delaying fertilization until early May.

Range-wide Status

The Indiana bat was officially listed as an endangered species on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa[c]). The Endangered Species Act of 1973 extended full protection to the species. Thirteen winter hibernacula (11 caves and two mines) in six states were designated as critical habitat for the Indiana bat in 1976 (41 FR 187). The Service has published a recovery plan (USFWS 1983b) which outlines recovery actions. Briefly, the objectives of the plan are to: (1) protect hibernacula; (2) maintain, protect, and restore summer maternity habitat; and (3) monitor population trends through winter censuses. The recovery plan is currently being updated to reflect new information concerning summer habitat use.

Based on censuses taken at hibernacula, the total known Indiana bat population is estimated to number about 388,000 bats (A. King pers. comm.). More than 85% of the range wide population occupies nine Priority One hibernacula (hibernation sites with a recorded population >30,000 bats since 1960), although two of these currently have low numbers of bats. Indiana, Kentucky, and Missouri each contain three Priority One hibernacula. Priority Two hibernacula (recorded population >500 but <30,000 bats since 1960) are known from the aforementioned states, in addition to Arkansas, Illinois, New York, Ohio, Tennessee, Virginia, and West Virginia. Priority Three hibernacula with recorded populations of <500 bats or records of single hibernating individuals have been reported in 17 states (Alabama, Connecticut, Florida, Georgia, Iowa, Maryland, Massachusetts, Michigan, Mississippi, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Vermont, and Wisconsin).

Indiana bat numbers have declined in every 10-year census period: ~883,300 Indiana bats in 1960/1970; 678,700 in 1980; 473,500 in 1990; and 382,300 in 2000/2001 (Clawson 2002). At the time of European settlement, it is believed that Indiana bats were a very abundant mammal, with more than 10 million bats occupying one hibernaculum alone (Tuttle et al. 2004). Since the 1960s, the Indiana bat has declined 57% (Clawson 2002). Despite recovery efforts, the populations in the southern part of the range (Alabama, Arkansas, Kentucky, Missouri, Tennessee, and Virginia) continue to decline, and cumulatively are down 80%. However, since the 1960s the northern part of the range (Illinois, Indiana, New York, Ohio, Pennsylvania, West

Virginia) has experienced a population increase of 30%. Winter population numbers of Indiana bats in Ohio are based on two hibernacula, located in abandoned limestone mines in Preble and Lawrence counties. In Ohio, 2004/2005 hibernacula census detected 9,769 individuals, down from the 2002/2003 census of 9,996.

Threats to the Species

The causes for the population decline of the Indiana bat have not yet been definitively determined. However, the documented and suspected reasons for decline include disturbance and vandalism during hibernation; improper cave gates and structures; natural hazards; microclimate changes in hibernacula; adverse land use practices; and chemical contamination. These are discussed further below:

Human disturbance of hibernating bats led to a decline in Indiana bat populations from the 1960s to the 1980s (USFWS 1999). Disturbance from recreational cavers and researchers entering hibernacula can cause bats to expend crucial fat reserves before they are able to forage in the spring. Changes in the microclimate of a cave or mine can affect temperature and moisture level, thereby affecting suitability of the hibernaculum or affecting bat physiology (Richter et al. 1993; Tuttle and Kennedy 2002). Changes in airflow and the microclimate could result in individuals having to use less optimal locations in the hibernaculum. This could leave them vulnerable to predation, freezing, or exhaustion of fat reserves. Improper gates have either rendered hibernacula unavailable to the Indiana bat, or have altered air flow causing hibernacula temperatures to be too high for bats to retain fat reserves through the winter (USFWS 1999). Natural hazards including flooding, freezing during severe winters, and ceiling collapse have caused the loss of Indiana bats during hibernation (USFWS 1999). Severe weather can affect bats roosting in summer habitat. There has been a documented occurrence of strong winds and hail stripping bark from a tree, forcing the bats to move to another roost (USFWS 1999). Land use practices, fire suppression, and agricultural development have all reduced available roosting and foraging habitat as well as reduced the abundance of insects for bat prey across its range. Bioaccumulation of environmental contaminants is also suspected as a potential factor in the decline of the Indiana bat (USFWS 1999). Organochlorine insecticides may have resulted in chronic mortality of Indiana bats (O'Shea and Clark 2002). Schmidt et al. (2002) measured levels of Polycyclic Aromatic Hydrocarbons (PAH) and organochlorine pesticides in surrogate bat species to ascertain potential effects to the Indiana bat. At low concentrations, these chemicals cause cancer and cellular mutations in mammals, and may affect reproductive success by reducing viability of gametes or offspring.

Environmental Baseline

*This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the **action area**. It includes a description of the status of the species within the **action area**.*

The action area is located in a mixed-use area of Summit County, Ohio, and includes the 24-acre USAR property plus a 3200 foot buffer surrounding the property. This encapsulates privately owned forested areas, local park land, and developed areas including roads, parking lots, and residential and commercial properties.

The 24-acre USAR property is entirely forested. The majority of the 24 acres is composed of mature forest (containing trees averaging 18 inches dbh) and does not appear to have been disturbed in the last 50 years. The southern two-thirds of the site (most of which will be developed) consists of a red maple/American beech (*Acer rubrum/Fagus grandifolia*)-dominated forest with northern red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), and American elm (*Ulmus americana*) scattered within. Glossy buckthorn (*Rhamnus frangula*), spicebush (*Lindera benzoin*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*) compose much of the understory on the site. The herbaceous layer contains a variety of species including mayapple (*Podophyllum peltatum*), wild geranium (*Geranium maculatum*), and dogtooth violet (*Erythronium americanum*). Approximately three acres in the northeast corner of the site appear to have been substantially disturbed in the past, but are still forested. This portion of the site contains small piles of fill dirt, rock, concrete, and exposed metal bars. Average overstory canopy cover on the entire site is approximately 75%, and percent cover in the understory is approximately 30%.

The 24-acre USAR property contains 7 palustrine forested wetlands that total 4.27 acres. No streams are located within the property.

The 24-acre USAR property is relatively flat with a gentle downward slope from the southeast corner to the northern end. Relief across the entire site is approximately 6 feet. The predominant soil type on the site is the Mahoning (0 to 2 percent slope) silt loam, which has low permeability, slow runoff, and promotes seasonal ponding. A second minor soil type at the site is Trumbull silt loam, which occurs along the western edge of the site and has an even greater tendency for slow runoff and ponding during wet seasons (USAR 2005).

Within the 3200-foot radius area of indirect impacts, land use varies considerably. The parcel directly north of the 24-acre USAR property and south of East Aurora Road is undeveloped forest and is for sale. North of East Aurora Road is a mix of old field habitat, and residential and commercial properties. The land immediately west and northwest and adjacent to the USAR property lies within the City of Macedonia and is part of Longwood Park, a recreational area. Approximately 101 acres of woods are located within the park boundaries, within 0.6 miles of the USAR property (USAR 2005). The forest in Longwood Park is very similar in age and species composition to the southern two-thirds of the USAR property and is likely to be protected in perpetuity. An additional 189 acres of the park are managed for recreational purposes such as ballfields and picnic facilities, and a 3-acre pond is also present. East of the USAR site is Chamberlin Road and beyond that, the 2.4 million-square-foot Daimler Chrysler Twinsburg Stamping Plant, and associated parking facilities. Beyond this area to the east are residential neighborhoods. South of the Daimler Chrysler property (and southeast of the USAR property) is a forested parcel similar in age and composition to the forest on the USAR property. Further south beyond this area are residential and commercial properties. The forested parcel located south of the USAR property contains a UAW Local 122 building that is situated in close proximity to the southern USAR property boundary. The UAW Local 122 property includes paved parking areas, lawns, mature trees in an area with cleared understory, and a picnic area. Further south of the UAW property is Highland Road and south of the road are residential and commercial properties.

The 24-acre USAR property was subjected to an analysis of habitat suitability, using the Indiana Bat Summer Habitat Suitability Index (HSI) Model (Romme et al. 1995). The HSI model incorporates eight parameters to assess the quality of Indiana bat habitat. These include the following:

- (1) average percent overstory canopy cover
- (2) average dbh of overstory trees
- (3) density of large trees (>8.7 inches dbh)
- (4) number of PRTs present
- (5) average percent of small trees (2-4.7 inches dbh)
- (6) average percent cover from 6.6 feet to bottom of overstory canopy
- (7) distance to water
- (8) percentage of forest cover within 0.6 miles

Based on the results of the HSI model, the overall quality of Indiana bat summer habitat on the 24-acre USAR property is high, scoring 0.74 on a scale of 0.0 to 1.0 (where 1.0 is highest quality). Foraging habitat appears to be distributed evenly throughout the property, while PRTs were more heavily distributed across the southern 19 acres. The southern 19 acres of the property scored 0.86 on the HSI, while the northern 5-acre set-aside scored 0.35 due to a low number of PRTs (USAR 2005).

The 24-acre USAR property was also surveyed to document the number and location of PRTs. A total of 198 PRTs were found on the property, including 17 PRTs in the northern 5-acre set-aside, and 181 PRTs in the southern 19 acres. The average density of PRTs is 8.25 per acre across the entire property, 3.4 per acre in the 5-acre set-aside, and 9.5 per acre in the southern 19 acres (USAR 2005).

Status of the Species within the Action Area

USAR's BE (2004) indicated that suitable roosting and foraging habitat for the Indiana bat exists onsite. Furthermore, the BE indicated that during a general visual bat survey at least four individual bats were visually observed flying over and within the canopy of the forest and in the small open field just south of the 24-acre site. In addition, both male and female Indiana bats have been documented within 5 miles of the property (M Johnson, MPSSC, pers. comm.). Based on this information, the Service requested that a mist-net survey be performed to further assess bat use of the project area.

An Indiana bat mist-net survey was undertaken by BHE Environmental, Inc. to document bat use of the project area and to detect any potential maternity colonies that may be using the site. The survey was completed between July 21-23, 2004, and met or exceeded all recommendations of the Service's approved Indiana bat mist net survey protocol. In addition, the Service determined that the weather conditions and level of effort were appropriate to identify presence of the Indiana bat. The Indiana bat survey did not result in the capture of any Indiana bats. Only one individual bat, a northern long-eared bat (*Myotis septentrionalis*) was captured throughout the duration of the survey (BHE 2004a). Based on the results of the survey, the presence of a high density of Indiana bats onsite was not confirmed.

Although Indiana bats were not documented within the action area during the 2004 mist-net survey, this highly mobile species has been documented in close proximity to the action area. A post-lactating Indiana bat was captured 2.5 miles north of the project in August 2004 (Mike Johnson, MPSSC, pers. comm.), indicating the likely presence of a maternity colony within close proximity to the action area. In addition, 8 male and female Indiana bats have been captured swarming near two sandstone ledges approximately 3.5 miles east of the action area in the fall of 2004 (Mike Johnson, MPSSC, pers. comm.). Swarming and staging surveys of bats at the entrances to the sandstone ledges during spring 2004 and fall 2003 and 2004 have documented a variety of bat species utilizing the ledges for hibernation. Little brown bats (*Myotis lucifugus*), northern long-eared bats (*Myotis septentrionalis*), big brown bats (*Eptesicus fuscus*), and pipistrelle bats (*Pipistrellus subflavus*) have been documented by emergence surveys at the ledges in April and May, 2004, indicating that the ledges are serving as hibernacula for these species (Mike Johnson, MPSSC, pers. comm.). Because Indiana bats have only been captured during the fall and not during the spring, and because the interior of the caves cannot be accessed, the Service cannot definitively state that these ledges are serving as hibernacula for Indiana bats, although we assume that they are based on the presence of Indiana bats swarming in the fall (Mike Johnson, MPSSC, pers. comm.), the presence of visibly suitable hibernation habitat, and the presence of other hibernating bat species that are commonly found to share hibernacula with Indiana bats at other locations (Brack et.al 2003).

Interpretation of survey results

Although a mist-net survey following accepted protocol did not detect Indiana bats in the action area, this highly mobile species has been detected nearby during summer and fall (Mike Johnson, MPSSC, pers. comm.), and assumed hibernacula exist within 3.5 miles of the action area (Mike Johnson, MPSSC, pers. comm.). In order to assess the potential for the Indiana bat to occur within the action area, the Service must formulate reasonable assumptions. These assumptions must be made in order to analyze the potential effects of the action. It is important to note that the Service has been mandated by Congress to provide the benefit-of-the-doubt to federally-listed species (H.R.Conf. Report No. 697, 96th Cong., 2d Session 12, 1979). That is to say, the Service must err on the conservative side; the side of the species, when making reasoned assumptions.

High quality roosting and foraging habitat, comprised primarily of mature beech/maple forest, has been documented within the 24-acre USAR property, and data provided in the 2005 USAR BA indicate that the composition of forested areas adjacent to the USAR property and within the action area are comparable to the habitat found on the 24-acre USAR property. Therefore, the Service believes that it is reasonable to assume that all forested habitat in the action area is high quality habitat for the Indiana bat.

The Service assumes that the Indiana bats occurring 2.5 miles north of the action area include a maternity colony based on the following factors: (1) The capture of a post-lactating Indiana bat during the summer of 2004 (Mike Johnson, MPSSC, pers. comm.); (2) The capture site is connected to the project area via somewhat fragmented stream and forested corridors, which provides a potential travel corridor from the capture location to the action area; and (3) Other female Indiana bats have been documented swarming at the ledges southeast of the female

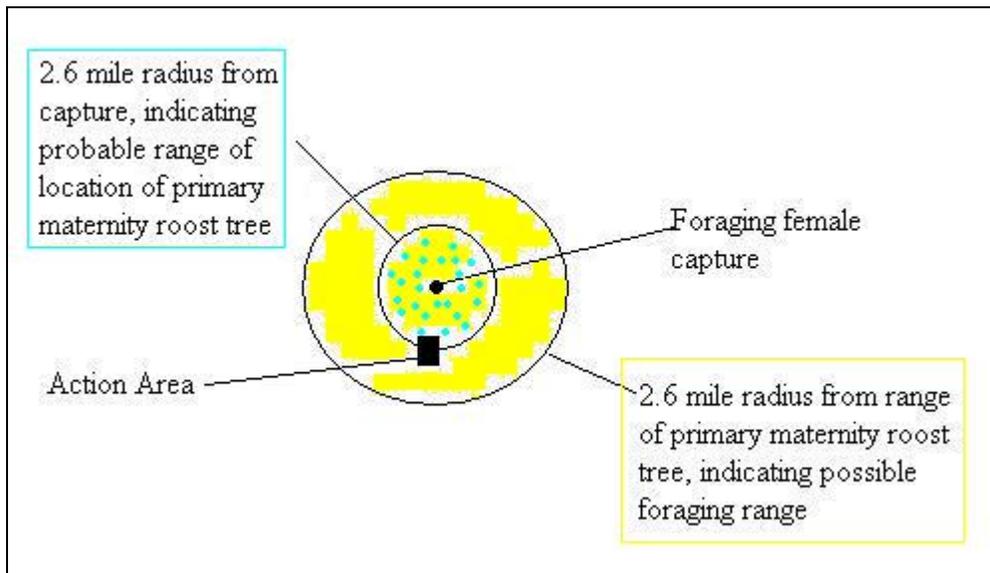
capture location, indicating that landscape conditions within this region are suitable for Indiana bat roosting and foraging. Therefore, the Service believes it is logical and reasonable to assume that a maternity colony is present north of the action area.

The Service estimates that the maternity colony north of the action area is comprised of approximately 80 adult female Indiana bats. This estimate is based upon the following factors: (1) most documented maternity colonies are typically made up of 50 to 100 adult female bats, and (2) Whitaker and Brack (2002) estimated the average size of a maternity colony is approximately 80 adult female Indiana bats. Therefore, for the purposes of this analysis, the Service has selected the average number of 80 female bats per maternity colony as a reasonable estimate of the size of the maternity colony north of the action area. Additional young (up to one juvenile per year per female bat) are likely present north of the action area during the summer maternity season.

Female Indiana bats have been documented to travel up to 2.6 miles from their roosting habitat to forage (Murray and Kurta 2004). The female Indiana bat north of the action area was captured while foraging, therefore we assume that the primary and secondary roost trees for the maternity colony are located within a 2.6-mile radius from the capture location. This 2.6-mile radius would include the action area (see Figure 1). The action area has been documented to provide high quality Indiana bat roosting habitat. Because the Indiana bat survey did not detect Indiana bats onsite, and because the level of the survey is usually sufficient to detect the presence of the Indiana bat (USFWS 1999), we assume that the primary maternity roost tree is not located on the 24-acre USAR property, however we find it reasonable to assume that one or more alternate maternity roost trees may be located within the action area. Based on the limited size of the action area and the adjacent high quality habitat, it is likely that at least some of the colony's roost trees would occur outside of the action area.

As previously discussed in the Life History section of this BO, female Indiana bats have been found to travel up to 2.6 miles from their day roost(s) to forage (Murray and Kurta 2004). A female Indiana bat was captured while foraging 2.5 miles north of the action area. This capture indicates that the day roost(s) could be anywhere within a 2.6 mile radius of the capture location, and this radius would include the action area (See Figure 1). Because a maternity colony is assumed to exist within 2.5 miles of the action area, and the action area is connected to the capture location via forested corridors, and the action area provides high quality foraging habitat, we assume that female Indiana bats are using the action area for foraging. Because the mist net survey did not detect Indiana bats, we assume that only small numbers of female bats are using the 24-acre property, and that their use may be sporadic.

Figure 1. Diagram showing relationship between capture location of female Indiana bat, probable range within which primary maternity roost tree occurs, and probable range of foraging area, relative to action area. Diagram is not to scale.



The presence of Indiana bats at the sandstone ledges in the fall provides evidence that the ledges are important for one or more of the following reasons: (1) they are used during migration, (2) they serve as a location for swarming, or (3) that they are used for hibernation. There is generally no way to determine the precise reason that Indiana bats were located at the portals. However, some reasonable assumptions can be made based upon the available data. These assumptions will assist the Service in analyzing the potential effects of the action.

The Service considers it reasonable to assume that an Indiana bat Priority III hibernacula, supporting several hibernating Indiana bats, occurs at the ledges. The assumption that these ledges serve as potential hibernacula is based on the following factors; (1) Indiana bats have been captured during the fall swarming and migratory period at both ledge locations (M Johnson, MPSSC, pers. comm.), (2) Four other species of bats were captured and/or detected at these portals during spring and fall sampling indicating that the mines may provide suitable conditions for bat hibernation (M Johnson, MPSSC, pers. comm.), (3) The four species detected are often found within the same hibernacula as Indiana bats in other locations, (4) Bat swarming activity was noted by qualified bat biologists at these ledges (M Johnson, MPSSC, pers. comm.), (5) Indiana bat swarming activity typically occurs at hibernacula (USFWS 1999), (6) The low number of Indiana bats detected at these ledges (eight) is indicative of hibernacula currently supporting a small number of hibernating Indiana bats, (7) Known Indiana bat hibernacula in Ohio are Priority III hibernacula (hibernacula with < 500 Indiana bats) with the exception of the Priority II hibernacula (≥ 500 to 30,000 Indiana bats) containing 9,436 Indiana bats in Preble County (BHE 2004b), and (8) The ledges were surveyed for bats because they exhibited a combination of conditions that are considered as general indicators that they could support hibernating bats.

The Service believes it is reasonable to assume that male Indiana bats are using the action area to forage, and may also roost singly in small numbers within the action area, based on the following information: 1) Male Indiana bats have been captured swarming at the ledges 3.5 miles from the 24-acre USAR property (M Johnson, MPSSC, pers. comm.), 2) A Priority III hibernacula is assumed to exist within 3.5 miles of the 24-acre property (see above assumption), 3) As discussed in the Life History section of this BO, male Indiana bats often roost near their hibernacula all summer (Whitaker and Brack 2002, USFWS 1999), using multiple different roost trees in one season to fulfill their thermoregulatory requirements, 4) Males may travel up to 2.6 miles from their summer roosts to forage (USFWS 1999), 5) Males may travel farther to forage in the fall than in the summer, and 6) The action area supports high quality roosting and foraging habitat (USAR 2005). Because the mist net survey did not detect Indiana bats, we assume that only small numbers of male bats are using the site, and that their use may be sporadic.

In summary, high quality Indiana bat roosting and foraging habitat has been documented throughout the action area. Male Indiana bats likely occur throughout the action area during the summer in low densities, and likely use the action area for roosting and/or foraging. Data also supports the assumption that a maternity colony, comprised of 80 adult females and their young (up to one juvenile per year per female bat), occurs near the action area, and that a small number of members of this colony may use the action area for foraging and/or for secondary roosting habitat.

Factors affecting species environment within the Action Area

Development

Both current and past, commercial and residential development have been identified within the action area. The proposed action will result in the permanent loss of 18 acres of roosting and foraging habitat for the Indiana bat. The parcel of land directly south of the 24-acre USAR property is partially developed with a UAW building, and is partially forested. Areas south of Highland Road support residential and commercial developments. The parcel of land north of East Aurora Road has been partially developed with residential properties. The parcel of property east of the 24-acre USAR property has been completely developed with roads, parking facilities, and the Daimler Chrysler Plant, and beyond this to the east are residential properties. It is likely that past development has resulted in a loss of suitable Indiana bat roosting and/or foraging habitat, and the potential future development at the 24-acre USAR property will result in the loss of additional suitable roosting and foraging habitat for the Indiana bat.

Recreation

To the immediate west of the 24-acre USAR property is Longwood Park, a recreational area. Approximately 101 acres of forest habitat within park boundaries are located adjacent to the 24-acre USAR property. This property is protected in perpetuity, and is managed for forest vegetation. An additional 187 acres are managed for recreational activities, and a 3-acre pond is also on the park property. It is likely that the forested portions of Longwood Park will provide

high quality habitat for the Indiana bat in perpetuity, while the pond and perhaps the open field areas may provide foraging opportunities.

Effects of the Action

In evaluating the *effects of the action*, section 7 of the Endangered Species Act and the implementing regulations (50 CFR §402) require the Service to consider both the direct and indirect effects of the action on the species, together with the effects of other activities that are interrelated or interdependent with the action that will be added to the environmental baseline. *Direct effects* are those effects that have immediate impacts on the species or its habitat while *indirect effects* are those that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. *Interrelated actions* are those that are part of a larger action and depend on the larger action for project justification. *Interdependent actions* are those actions that have no independent utility apart from the action under consideration.

The *effects* evaluation is necessary to make the required determination under 7(a)(2), of insuring the Federal action does not jeopardize the continued existence of the species, or result in the destruction or adverse modification of designated critical habitat. *Jeopardize the continued existence* of a species means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. The following analysis will evaluate the effects of the proposed project in relation to the reproduction, numbers and distribution of the Indiana bat within the action area, and then further evaluate these effects in the context of the overall range-wide species status and cumulative effects to the species.

Beneficial Effects

The USAR proposes to preserve and actively manage the northern 5 acres of the 24-acre property to increase the value of the habitat for Indiana bats (USAR 2005). Currently the northern 5 acres supports high quality foraging habitat, but the low density of potential roost trees limits the overall suitability of the site for Indiana bats. The USAR proposes to promote the development of suitable roost trees and to preserve and enhance foraging habitat. These measures will benefit the Indiana bat by increasing the habitat value of the northern 5 acres, and protecting this area in perpetuity.

Due to the proposed onsite wetland impacts, the USAR will be required to perform wetland mitigation to comply with Sections 401 and 404 of the Clean Water Act. Working in conjunction with Ohio EPA and the U.S. Army Corps of Engineers, the USAR will create approximately 7.3 acres of wetlands. All mitigation wetlands will be protected in perpetuity. The precise location of the mitigation wetlands is not known; however, constructed wetlands will be located off-site and preferably within the Cuyahoga River watershed. At the request of the Service, USAR has examined opportunities for wetland mitigation that would improve Indiana bat habitat, specifically working in conjunction with MPSSC. At this time, no feasible wetland mitigation is available, however USAR has committed to checking back with MPSSC for wetland mitigation options prior to making a final decision on wetland mitigation. Feasible

wetland mitigation opportunities in closest proximity to the suspected hibernacula will be preferred. It is anticipated that wetland mitigation will result in an additional 7.3 acres of suitable roosting and/or foraging habitat for the Indiana bat that will be protected in perpetuity.

In total, more than 6 acres of the 24-acre USAR property will be permanently preserved, and will provide high quality roosting and foraging habitat for the Indiana bat onsite in perpetuity. Wetland mitigation will eventually create approximately 7.3 acres of forested wetland habitat within the Cuyahoga River watershed that will likely provide suitable roosting and/or foraging habitat for the bat in perpetuity.

Direct Effects

Direct adverse effects to the bat have been largely avoided by the USAR's proposed timeframe for tree clearing. USAR proposes to remove trees only between November 1 and March 15, when the bats would be hibernating in caves and/or mines, and not using the forested habitat within the action area. The direct effects of the action (ie., noise, vibrations) are not expected to reach the suspected Indiana bat hibernacula, as the hibernacula are located outside of the action area. Therefore, the Service anticipates that no direct adverse effect to the Indiana bat will occur.

Indirect Effects

Indirect adverse effects to the Indiana bat are anticipated to occur, and would primarily take the form of harm and/or harassment due to loss of roosting and foraging habitat and decreased prey availability within the action area. These effects are discussed further below.

Loss of roosting habitat

Indirect effects on the maternity colony

One of the most substantial indirect effects on the Indiana bat from the proposed activities will be the loss of high quality Indiana bat maternity roosting habitat. Approximately 18 acres of clearing and grubbing for construction will occur between November 1 and March 15. Within the 18 acres of clearing, up to 181 PRTs greater than 1.9 inches dbh will be removed. The 18 acres and up to 181 PRTs will be permanently lost and will no longer provide suitable roosting habitat for the small number of individuals of the Indiana bat maternity colony that may sporadically use alternate roost trees located on the site.

When female bats return to their summer maternity area in the spring after tree clearing activities have occurred, it is likely that they will first attempt to use the same roosting areas that were used in previous years because they are philopatric (Kurta and Murray 2002). It is also likely that these pregnant females will suffer stress while searching for new roosting areas. It is not known how long or how far female Indiana bats will search to find new roosting habitat if their traditional roost habitat is lost or degraded. If they are required to search for new roosting habitat in the spring, this effort will place additional stress on pregnant females at a critical time when fat reserves are low or depleted, and they are already stressed from the energy demands of migration and pregnancy.

It appears that when a primary roost tree falls, members of a colony may initially distribute themselves among several previously used alternate roost trees (USFWS 2002; Kurta et al. 2002). It is likely that due to the ephemeral nature of roost trees, the Indiana bat has evolved to be able to relocate replacement roosts, if available, when their previously-used roost trees become unsuitable. As discussed in the Environmental Baseline above, we assume that a primary maternity roost tree is not located within the action area, therefore we do not anticipate that indirect effects to the maternity colony will occur from the loss of a primary maternity roost tree. We do assume that one or more alternate maternity roost trees are located within the action area, and assume that one or more of these will be removed to facilitate construction. Considering the relatively restricted footprint of forest impacts (18 acres) it is plausible that at least some, and probably most, of the colony's alternate roosts occur outside of the footprint of forest impacts. The availability of a considerable amount of suitable roosting habitat in the surrounding landscape (e.g., Longwood Park, 5-acre northern set-aside, portions of UAW property to the south) and the likelihood that some of the colony's alternate roosts will remain standing outside the footprint of tree clearing following clearing activities suggest that the colony may successfully locate new alternate roosts within days of returning from their hibernaculum.

The effects of the loss of traditional roost habitat may be amplified by the poor thermoregulatory abilities of pregnant and lactating females (Studier and O'Farrell 1972 in Humphrey 1975). Pregnant bats not only need to secure sufficient food to maintain their body weight and temperature, they also need to support a growing fetus or pup. In spring, maintaining an energy balance is complicated by the need for pregnant bats to migrate to their traditional roosting areas after completing 6 to 7 months of hibernation, and hence, having depleted or low fat stores, and during a time when temperatures are low and food is scarce (Kurta and Rice 2002). Consequently, during this period pregnant females are less able to maintain their current energy input and are likely unable to easily increase energy gain (increase food intake) in response to low temperatures. Hence, females face a delicate energy balance through rearing of young. The removal of one or several alternate roosts within the 18 acre footprint of tree clearing may cause some females to alter roosting and/or foraging areas somewhat; however, the limited footprint of clearing comprises only a small amount of the average foraging range area of a female Indiana bat (Kiser and Elliott 1996, Murray and Kurta 2004), and more than 100 acres of high quality Indiana bat habitat is located adjacent to the footprint of clearing (USAR 2005), so it is likely that any displaced female bats will be able to quickly locate other traditional alternate roosts without significant reproductive consequences.

As previously described, harassment, a form of take, is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Therefore, based on the above information, the Service believes that take in the form of harassment due to the disruption of roosting areas for a few individual female bats is reasonably certain to occur.

Indirect effects on male bats

In addition to a maternity colony, the project area is assumed to sporadically support small numbers of adult male Indiana bats. In general, the indirect effects to male Indiana bats in the action area due to the loss of roosting habitat would be similar the effects on Indiana bats associated with a maternity colony. During the summer, male Indiana bats typically roost alone or occasionally in small groups. Based upon the 2004 survey of the 24-acre USAR property, information from the nearby capture records of Indiana bats, the suitability of habitat on the 24-acre property, and Indiana bat life history, Indiana bats of any reproductive condition are likely roosting and/or foraging in the project footprint sporadically. Therefore it is anticipated that the indirect effects to male Indiana bats will likely be similar to effects on reproductive females. Therefore, based on the above information, the Service believes that take in the form of harassment due to the disruption of roosting areas for a few individual male bats is reasonably certain to occur.

Loss of foraging habitat

Another indirect effect of the proposed project on the Indiana bat will be the loss of foraging habitat. Eighteen acres of high quality foraging habitat will be permanently lost due to implementation of the proposed action.

Indirect effects to the maternity colony

Indiana bats exhibit strong site fidelity to their traditional summer colony areas and foraging habitat, that is, they return to the same summer range annually to bear their young (Kurta et al. 2002; Garner and Gardner 1992; Gardner et al. 1991; Humphrey et al. 1977; Gardner et al. 1996; Cope et al. 1974). Telemetry studies on a maternity colony in Indiana have indicated that Indiana bats continue to return to areas that previously served as foraging habitat, even after those areas have been developed and no longer provide suitable habitat (USFWS 2003).

This information indicates that when the females of the maternity colony in and near the action area return to their summer range, individuals will attempt to use the same foraging areas that were used in previous years. After clearing is completed on the project area, 18 acres of high quality foraging habitat will no longer be available.

In general, Indiana bats are reluctant to cross open areas (Brack 1983; Menzel et al. 2001). Once the project footprint area has been cleared, some Indiana bats whose foraging and commuting areas have been altered may avoid flying across this area. These individuals would be subject to an increase expenditure of energy to establish a new roosting area as well as travel corridors between roosting and foraging. Bats in this scenario would be subject to take in the form of harm or harassment as they are displaced from their home range. The USAR has sought to reduce the potential for adverse effects from disruption of travel corridors by maintaining connectivity between the 24-acre project site and adjacent forested parcels via a 30-foot buffer along the western property line, the 5-acre set-aside along the northern property line, and by planting trees along the southern and eastern property lines. The Service anticipates that these

conservation measures will substantially minimize potential adverse effects to individual female Indiana bats from fragmentation by maintaining forested connectivity between the 24-acre USAR property and adjacent forested parcels.

The destruction and/or degradation of 2.9 acres of forested wetlands within the 18-acre footprint will eliminate foraging areas and drinking sources for the Indiana bat. In addition, the Indiana bat's prey base will be reduced due to the loss of insects associated with the 2.9 acres of wetland and 15.1 acres of upland forest in the project footprint.

The effects to individual bats from the loss of foraging habitat are likely to vary based upon each bat's usage of this area. As stated in the Environmental Baseline above, we assume that only low numbers of Indiana bats use the project area for foraging, and that Indiana bat use of the project area is sporadic. Because it is likely that Indiana bats only forage in the project area occasionally, they would be familiar with other nearby foraging areas and should be able to quickly adjust their foraging habitats by spending more time foraging in other portions of their range. For bats that foraged more extensively within the project area, the effect may be more severe. Due to the small size (18 acres) of the project footprint, and the negative Indiana bat survey results on the 24-acre USAR property, it is unlikely that any bats forage in the project area extensively or exclusively.

In addition to the Indiana bat, 4 other species of bats (little brown bat, northern long-eared bat, eastern pipistrelle, and big brown bat) were captured in and around the action area during mist-net surveys (BHE 2004a, Mike Johnson, MPSSC, pers. comm.). Therefore, the potential for the project to increase inter- and intra-specific competition during foraging must also be considered. Although very little literature is available to assess the impact of this effect, interspecific competition has been identified as an area of concern by researchers monitoring maternity colonies subject to habitat alterations in Indiana (USFWS 2003). Feeding habits for Indiana bats are similar to those of the little brown bat, the northern long-eared bat, and to a lesser extent the eastern pipistrelle (Whitaker 2004). Therefore competition between those species could occur as all species within the 18-acre footprint could potentially be displaced and forced to move quickly into other foraging habitat. However, the effects to individual bats from the loss of foraging habitat and increased competition may be somewhat offset by the availability of a significant amount of suitable foraging habitat in the surrounding landscape and the likelihood that most bats, regardless of species, do not forage exclusively or extensively in the 18-acre area to be cleared. The quantity and quality of the habitat that will remain outside the 18-acre footprint suggests that individual Indiana bats may have little difficulty successfully locating and establishing modified or new foraging areas and that adverse effects from competition may not be detectable.

It is also important to consider the potential effects to reproductively active females in concert with other life history and environmental factors. Indiana bats that are already subject to the energy demands of hibernation, migration, and pregnancy may be displaced from their preferred foraging ranges. They will then have to expend energy to search for new areas to forage while at the same time being subject to an increase in competition for prey. In addition, environmental factors, such as an unseasonably cool spring, could limit the availability of prey while at the same time increase the energetic cost of thermoregulation. When combined, these factors could

reduce the fitness of pregnant Indiana bats to the extent that some may not successfully bear a pup and/or some pups may be born with lower birth weights such that their pups may have delayed development. However, due to the limited footprint of tree clearing, available adjacent forested habitat, and the likelihood that the 18-acres to be cleared is only a small part of the traditional foraging range of a female bat, individual Indiana bats may have little difficulty successfully locating and establishing modified or new foraging areas and adverse effects from competition may not be detectable.

Because insects associated with aquatic habitats make up part of the diet of Indiana bats, water quality can affect the prey base of the species. Approximately 2.9 acres out of a total of 4.0 acres of forested wetlands will be filled due to project implementation, thereby eliminating a portion of the total potential sources of aquatic insects on the 24-acre site. In response, bats will seek alternate food sources in other upland and riparian areas. However, upland food sources within the 18-acre footprint will also be reduced after forested habitat is removed by clearing and grubbing activities. Bats of other species will also be displaced, thus compounding interspecies competition. USAR has proposed conservation measures (see “Description of the proposed action” above) to minimize the impact of sedimentation and runoff on wetlands adjacent to the 18-acre footprint. These measures will serve to avoid and minimize any water quality impacts outside of the 18-acre footprint, and hence minimize impacts to the aquatic insect prey base.

Indiana bats that remain loyal to foraging areas and/or travel corridors may continue to cross the project area following the clearing activities. These Indiana bats would be subject to an increased risk of predation because they would be more visible to predators. Yet, there is no way to meaningfully measure this increased predation risk. If any predation of Indiana bats occurs indirectly as a result of the project, it is not likely to be detected.

Overall, the effect of the loss of 18-acres of high quality foraging habitat on individual bats from the maternity colony will range from insignificant and discountable effects to take in the form of harm and harassment. Due to the small footprint of the project, the foraging areas for many of the bats would likely be entirely or mostly outside the project footprint. The affects to these individuals are anticipated to be minimal. Individual bats that may use the 18-acre footprint for foraging may have to expend an increased amount of energy to establish new foraging areas, thereby further reducing their fitness for successful reproduction. Additionally, the effects on individual bats will differ depending upon variable factors such as the weather and the condition of individuals upon emergence from hibernation.

Indirect effects on male bats

As predicted with the maternity colony, most males are likely utilizing foraging areas that lie entirely or mostly outside the tree clearing footprint due to the small footprint of the forest impacts. Effects to these individuals are anticipated to be minimal, although they may be forced to find new foraging areas or forage more heavily in other portions of their established foraging range. However, these effects would not be complicated with the energy demands of pregnancy and rearing of pups and are therefore anticipated to be minimal.

Individuals seeking modified or new foraging areas will be subject to an increase in inter- and intra-specific competition. As with the reproductive females, the effects to individual male bats from the loss of foraging habitat and increased competition may be somewhat offset by the availability of suitable foraging habitat in the surrounding landscape. The quantity and quality of the habitat that will remain outside the project footprint suggests that males may have little difficulty successfully locating and establishing modified or new foraging areas.

In general, Indiana bats are reluctant to cross open areas (Brack 1983, Menzel et. al 2001). Once the project footprint has been cleared, some Indiana bats whose foraging and commuting areas have been altered may avoid flying across this area. These individuals would be subject to an increase expenditure of energy to establish a new roosting area as well as travel corridors between roosting and foraging. Bats in this scenario would be subject to take in the form of harm or harassment as they are displaced from their home range. The USAR has sought to reduce the potential for harm from disruption of travel corridors by maintaining connectivity between the 24-acre project site and adjacent forested parcels via a 30-foot buffer along the western property line, the 5-acre set-aside along the northern property line, and by planting trees along the southern and eastern property lines. The Service anticipates that these conservation measures will substantially minimize potential adverse effects to individual male Indiana bats from fragmentation by maintaining forested connectivity between the 24-acre USAR property and adjacent forested parcels.

Due to the availability of suitable roosting and foraging opportunities in the surrounding landscape, it is likely that displaced male bats will have little difficulty in establishing new home ranges within a few days of returning to their summer areas. Under this scenario, take of male bats is anticipated to be short term in the form of harassment. The effect on pregnant bats is likely to be more severe (as discussed previously). Indiana bats that remain loyal to foraging areas and/or travel corridors may continue to cross the project area following the clearing activities. These Indiana bats would be subject to an increased risk of predation because they would be more visible to predators. Yet, there is no way to meaningfully measure this increased predation risk. If any predation of Indiana bats occurs indirectly as a result of the project, it is not likely to be detected.

Indirect effects of decreased water quality

The Service believes that the loss of 2.9 acres of wetlands within the 18-acre footprint and will cause a reduction in aquatic insect prey base and drinking sources for the Indiana bat within the 18-acre footprint. Conservation measures will be implemented to avoid and minimize any potential impacts to adjacent wetlands outside of the 18-acre footprint due to sedimentation and runoff. Indirect adverse affects to Indiana bats from this decrease in aquatic insect prey and drinking sources is likely to be undetectable due to the small footprint of the project combined with the availability of suitable habitat in the surrounding landscape and the assumption that bats will use or seek alternate areas for foraging and drinking as some areas become unsuitable. The Service presumes that the surrounding landscape will continue to provide an abundant prey base of both terrestrial and aquatic insects during project construction, operation and maintenance. Therefore, any potential indirect adverse affects to Indiana bats from a reduction in water quality is anticipated to be insignificant and/or discountable.

Indirect Effects caused by disturbance

In addition to the actual habitat removal in the project footprint and the indirect effects associated with that removal, the proposed project may also indirectly decrease the quality of habitat surrounding this area. Indiana bats remaining in the action area during construction will be subject to noise disturbance from clearing, grading and construction activities. As a result, Indiana bats in the action area will be exposed to noise levels, or intensity of noise and vibrations that they may not have experienced in the past, depending on the proximity of their roost sites to other human activities nearby.

The current ambient noise within the action area varies greatly depending upon the proximity of the given area to existing activities. Portions of the action area are heavily developed with roads, parking lots, or residential or commercial structures, and the noise surrounding these areas would be significantly greater than the noise at the center of the 24-acre USAR's western property boundary, which is surrounded by forest habitat. Given the variable nature of the habitat within the action area, the lowest existing noise levels would be expected along the center of the western 24-acre property boundary, which is farthest away from roads and structures.

As discussed in the action area section above, the impact of increased noise is expected to be felt approximately 3200 feet from the operation of construction machinery on the 24-acre property. Within 3200 feet of the eastern property boundary, most of the land is developed with roads, parking lots, the Daimler Chrysler facility, and residential and commercial properties. This area does not provide suitable habitat for the Indiana bat, therefore no indirect effects are anticipated at this location. Within 3200 feet of the north, south, and west USAR property boundaries, suitable high quality Indiana bat habitat does exist, and indirect effects to the Indiana bats that use this area for roosting and/or foraging can be anticipated. Increased noise and vibrations during construction could cause disturbance to Indiana bats unaccustomed to these impacts while roosting and thereby lower the suitability of habitat adjacent to the project footprint.

Noise generated during the operation of the training facility should not be significant, as most of the activities will occur indoors. Therefore, noise during the operation of the training facility should not elicit any response from Indiana bats in the action area.

Effects on Numbers

We do not believe for reasons detailed above that the proposed action will result in the death of adult Indiana bats. We do not anticipate that the level of harassment of females, as described above, will result in females aborting or terminating their pregnancy. Therefore, we do not expect a reduction in numbers of Indiana bats due to the proposed action.

Summary of Effects

The Service anticipates that Indiana bats will incur indirect effects from the proposed USAR 88th RRC's proposed training center. The intensity of effects will differ by activity, season, and

condition and home range of individual bats. Indirect effects to Indiana bats are anticipated from the removal of habitat and due to noise disturbance.

Direct take (killing or injuring) of Indiana bats will be avoided due to project specifications that avoid cutting of potential roost trees between March 15 and November 1, when bats are most likely to occur within the action area. The suspected hibernacula are outside of the action area, therefore no effects on hibernating Indiana bats are anticipated.

Indirect effects on Indiana bats are anticipated from the project due to the loss and fragmentation of roosting and foraging habitat and disturbance from construction related noise. Some bats will be subject to take in the form of harm or harassment due to displacement from traditional roosts and foraging areas that are cleared. The effect upon individuals of the maternity colony would likely be more severe than males since pregnant females may be forced to alter their home ranges in the spring when they return to the area at a time when they are already stressed from the physical demands of pregnancy in addition to the decreased fitness following hibernation and migration. Noise associated with construction activities is anticipated to temporarily reduce the suitability of roosting habitat in portions of the action area. Take due to indirect effects is anticipated to range from harm or harassment caused by habitat loss to effects which may be insignificant or discountable, and will differ depending upon the home range and condition of individual bats as well as the tolerance of individual bats to noise disturbance.

Cumulative Effects

*Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the **action area** considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.*

An exhaustive examination of potential cumulative effects was included in the USAR BA (2005). This included contacting local and/or county planning commission in the four counties surrounding the action area (Cuyahoga, Summit, Portage, and Geauga Counties). Although general plans for residential and/or commercial development existed in three of the four counties, no specific projects or locations were able to be identified, so USAR determined that these plans did not qualify as reasonably foreseeable. Wooded habitat that is south of the Daimler Chrysler facility is assumed to provide habitat for the Indiana bat, but the Service is aware of no proposals for this property. The wooded parcel directly north of the USAR property is currently for sale and may be developed, although no proposal currently exists for this parcel. Because no proposals exist, these are not considered reasonably foreseeable actions.

Much of the remainder of the action area is already dedicated to permanent uses. The adjacent Longwood Park manages portions of their property for forest habitat, while the remainder is composed of ball fields and recreational areas. The multiple existing residential and commercial properties are fully developed within the action area and additional activities within these areas that could significantly impact the Indiana bat or its habitat are unlikely.

Any further actions occurring on the 24-acre USAR property are considered federal actions, and will be subject to separate section 7 consultations. Based on the above information, the Service and USAR have not been able to detect any future State or local actions that are reasonably certain to occur in the action area.

Conclusion

After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of the proposed USAR 88th RRC's proposed training center, and the cumulative effects, it is the Service's biological opinion that the construction and operation of the USAR's training center, as proposed, is not likely to jeopardize the continued existence of the Indiana bat, and is not likely to destroy or adversely modify designated critical habitat. Critical habitat for this species has been designated at hibernacula in Illinois, Indiana, Kentucky, Missouri, Tennessee, and West Virginia; however, this action does not affect these areas, thus, no destruction or adverse modification of that critical habitat is anticipated.

Based on the past rates of decline, the expected continued rate of decline, and lack of knowledge of the causes of the decline, it is reasonable to conclude that the species' survival is in serious question. As explained earlier, Indiana bats continue to decline. Although their absolute numbers are seemingly high, the Indiana bat life history strategy renders this species especially susceptible to population declines. As a result of these past and anticipated continued declines, the Indiana bat is increasingly highly endangered. Improving the reproductive success of Indiana bats is paramount for their continued survival. Maternity colonies represent an important population structure that is crucial to the survival of the Indiana bat.

In order to slow down and reverse the rate of decline, and get to survival and recovery, the Indiana bat not only needs to maintain its current rate of reproduction, but also increase its reproduction and decrease its mortality rates. Nevertheless, based on the Service's analysis of effects, it does not appear that the proposed action will significantly affect reproduction of Indiana bats or increase the species' vulnerability of extinction.

The Service concludes that overall the project will not contribute a measurable decrease in reproduction or numbers of the Indiana bat. The Service has also determined that the loss of 18 acres of high quality roosting and foraging habitat, the fragmentation of the suitable habitat on the 24-acre USAR property, and the loss of 2.9 acres of wetlands is not likely to result in an appreciable reduction to the distribution of the species given the availability of the remaining suitable habitat in the surrounding landscape and the availability of the nearby potential hibernacula.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by USAR for the exemption in section 7(o)(2) to apply. USAR has a continuing duty to regulate the activity covered by this incidental take statement. If USAR fails to assume and implement the terms and conditions of the incidental take statement the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, USAR must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [150 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Based on the proposed project as describe within and the conservation measures provided , we anticipate that incidental take of Indiana bats will occur in the form of harm or harassment through habitat loss.

Based on our analysis of the environmental baseline and effects of the proposed action, the Service anticipates that one maternity colony of Indiana bats and male Indiana bats sporadically occupy the action area in small numbers and may be impacted as a result of the proposed project. Collectively, the effects of the action are expected to result in behavioral or physiological effects which impair essential behavioral patterns. Decreased fitness of individuals may result.

Construction and operation of the USAR 88th RRC's training center is expected to result in the permanent loss of 18 acres of high quality roosting and foraging habitat and the fragmentation of the suitable habitat on the 24-acre USAR property.

The Service anticipates that incidental take of Indiana bats will be difficult to detect for the following reasons: no mortality of Indiana bats is anticipated to occur from construction and operation of the proposed training center; the species is highly mobile; the species occurs in habitat (e.g., trees) that makes detection difficult; and finding dead or moribund bats is unlikely due to a small body size and the likely scavenging of specimens by predators. However, the

following level of take of this species can be anticipated by (1) the loss of 18 acres of high quality roosting and foraging habitat, including 2.9 acres of wetlands, for project construction and operation, and (2) the fragmentation of suitable habitat on the 24-acre USAR property. We do not expect that individual bats will die as a result of the proposed action, rather we expect that reduced fitness of a small number of both male and female Indiana bats may result from displacement due to habitat loss, and that adjacent habitat may temporarily decrease in value due to construction noise.

Effect of the incidental take

In the accompanying biological opinion, the Service determined that, based on the proposed project and the conservation measures described within, this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and prudent measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Indiana bats. These measures are nondiscretionary:

1. Adhere to all of the conservation measures being proposed by USAR in the project description to avoid and minimize impacts to the Indiana bat.
2. The implementation status of all the proposed conservation measures, mitigation efforts, and terms and conditions will be monitored and clearly communicated to the Service on an annual basis.
3. The proposed “field cards” (educational pamphlets) to be distributed to employees and staff of the USAR center should be reviewed by the Service prior to publication to ensure accuracy of information.
4. To the maximum extent practicable, incorporate measures to benefit the Indiana bat into mitigation plans for wetland impacts.

Terms and conditions

In order to be exempt from the prohibitions of section 9 of the Act, USAR must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

1. Monitoring Requirements:

- A. USAR will prepare an annual report detailing all conservation measures, mitigation efforts, and terms and conditions that have been initiated, are ongoing, or completed during the previous calendar year and the current status of those yet to be completed.

The report will be submitted to the Service's Reynoldsburg Ohio Field Office (ROFO) by 31 January each year (the first report will be due January 31, 2006) and reporting will continue until the construction phase of the project is completed.

B. Any dead bats located within the construction limits, regardless of species, should be immediately reported to ROFO [(614) 469-6923], and subsequently transported (frozen or on ice) to ROFO. No attempt should be made to handle any live bat, regardless of its condition; report bats that appear to be sick or injured to ROFO. ROFO will make a species determination on any dead or moribund bats.

2. During the development of wetland mitigation plans required under the Clean Water Act, seek mitigation opportunities which both fulfill the requirements of the Act and benefit the Indiana bat through habitat protection, restoration and/or enhancement.

In conclusion, the Service believes that the USAR project will result in the permanent loss of 18 acres of high quality Indiana bat maternity, roosting and foraging habitat and will permanently fragment suitable habitat on the 24-acre USAR property. Temporary disturbances due to construction noise are anticipated within 3200 feet of the property boundary. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. USAR must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Expand on scientific research and educational outreach efforts on Indiana bats in coordination with ROFO.
2. In coordination with ROFO, MPSSC, and other local conservation organizations, purchase or otherwise protect suitable Indiana bat roosting, foraging, and hibernacula habitat in northeastern Ohio.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation with USAR on the construction and operation of the proposed USAR 88th RRC's training center in Summit Counties, Ohio. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For this biological opinion the incidental take would be exceeded when the impacts to forested habitat exceed 18 acres or the impacts to wetlands exceed 2.9 acres, which is what has been exempted from the prohibitions of section 9 by this opinion. The Service appreciates the cooperation of the USAR during this consultation. We would like to continue working with you and your staff regarding the construction and operation of the proposed USAR 88th RRC training center. For further coordination please contact Megan Seymour, (614) 469-6923 ext. 16 of this office.

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